

ABSTRACT

A system and method for synchronizing and selectively addressing multiple receivers in a wireless communication system includes a spread spectrum transmitter and one or more spread spectrum receivers. The transmitter transmits a signal having an observable parameter which is pseudo-randomly varied. The receiver measures the relative times between recurrences of a selected value of the observable parameter being pseudo-randomly varied, and determines an initial state of the transmitter based upon the measured relative times. The receiver then synchronizes itself to the estimated current state of the transmitter using the determined initial state as a starting reference. In a frequency hopping embodiment, the spread spectrum transmitter comprises a feedback shift register, and transmits a sequence of pseudo-randomly hopped frequencies determined by the shift register. A receiver is tuned to one of the hopping frequencies, measures the relative times of arrival between consecutive transmissions, and determines the initial code word in the transmitter feedback shift register from the measured relative times of arrival by constructing and solving a set of linear equations. The receiver then matches its feedback shift register to the initial code word, adjusted by an amount of time elapsed during the synchronization process. Similar techniques may also be applied both to direct sequence spread spectrum communication systems.